

WHAT IS CLAIMED IS:

1. A power transfer apparatus of a four-wheel drive vehicle, comprising:

5 a clutch that distributes a torque, that is generated by an engine via a transmission, between a primary wheel to a secondary wheel;

inversion detection means for detecting inversion or non-inversion of a gear-shifting direction of the transmission; and

10 control means for effecting a control operation such that torque to be transmitted by the clutch is decreased to a target value in accordance with an inversion signal pertaining to said gear-shifting direction detected by said inversion detection means.

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2. The power transfer apparatus according to claim 1, wherein said control means performs the control operation by setting a target control value corresponding to said target value of said torque to be transmitted, thereby
20 maintaining said target control value for a period of time.

3. The power transfer apparatus according to claim 2, further comprising:

25 accelerator or throttle position detection means for

detecting whether an accelerator or throttle position is in an arbitrary open position or an arbitrary closed position,

wherein, when the inversion signal detected by said
5 inversion detection means arises during the course of the accelerator or throttle position detected by said accelerator or throttle position detection means shifting again to an open position after having shifted from an arbitrary open position to an arbitrary closed position,
10 said control means sets said period of time on the basis of the inversion signal before the accelerator or throttle position again shifts to the open position.

4. The power transfer apparatus according to claim
15 3, wherein, when the inversion signal detected by said inversion detection means arises during the course of the accelerator or throttle position detected by said accelerator or throttle position detection means shifting again to an open position after having shifted from an
20 arbitrary open position to an arbitrary closed position and when shifting of the accelerator or throttle position from an arbitrary open position to an arbitrary closed position has been detected, said control means performs control operation for reducing the torque to be
25 transmitted by the clutch means and making a decrease

rate steep at the beginning and then gentle before the inversion signal detected by said inversion detection means arises.

5 5. The power transfer apparatus according to claim 4, wherein said control means makes equivalent to a time constant the decrease rate of the torque to be transmitted.

10 6. The power transfer apparatus according to claim 1, wherein said clutch comprises:

 a main clutch which is interposed between inner and outer rotary members, which enables transmission of torque by generating frictional engagement force when
15 said inner and outer rotary members rotate in relation to each other, and which increases or decreases said frictional engagement force in accordance with axial pressing force;

 a pilot clutch which performs frictional engagement
20 by means of electromagnetic force generated through said energization control; and

 conversion means which operates by means of frictional engagement of said pilot clutch, which converts force derived from frictional engagement of said
25 pilot clutch, and which imparts pressing force to said

main clutch.

7. The power transfer apparatus according to claim
1, wherein the driving force is transmitted in accordance
5 with the engagement force of the clutch while the
engagement force of the clutch is controlled.

8. The power transfer apparatus according to claim
1, wherein the driving force is transmitted while a
10 differential motion of a differential disposed between
the front and rear wheels is limited by controlling the
engagement force of the clutch.

9. A power transfer apparatus of a four-wheel drive
15 vehicle, comprising:

a clutch that distributes a torque, that is
generated by an engine via transmission, between a
primary wheel to a secondary wheel;

gear shift status detection means for detecting the
20 state of gear shift of the transmission; and

control means for controlling the clutch in such a
manner that the torque to be transmitted by the clutch
attains a target value in accordance with a gear shift
status signal detected by the gear shift status detection
25 means.

10. The power transfer apparatus according to claim
9, wherein the torque is transmitted in accordance with
an engagement force of the clutch while an engagement
5 force of the clutch is controlled by an electromagnetic
force derived from energization control.

11. The power transfer apparatus according to claim
9, wherein the torque is transmitted while a differential
10 motion of a differential disposed between the primary
wheel and the secondary wheel is limited by controlling
an engagement force of the clutch that is controlled by
the electromagnetic force derived from energization
control.

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12. A power transfer apparatus of a four-wheel drive
vehicle, comprising:

a clutch that distributes a torque, that is
generated by an engine via transmission, between a
20 primary wheel to a secondary wheel;

means for detecting a gear shifting condition of the
transmission; and

a controller that receives an input signal
indicating the gear shifting condition and generates a
25 control signal that reduces a torque transmitted by the

clutch to a target value.

13. The power transfer apparatus according to claim
12, wherein the gear shifting condition is a gear
5 shifting inversion of the transmission.

14. The power transfer apparatus according to claim
12, wherein the gear shifting condition is the state of
gear shift of the transmission.
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15. A device for controlling torque transmitted by a
clutch, comprising:
a controller that generates a control signal based
on an input received from a transmission, wherein said
15 control signal is output to said clutch to decrease said
torque to a target value.

16. The device according to claim 15, wherein the
input is indicative of an inversion in a gear-shifting
20 direction of the transmission.

17. The device according to claim 13, wherein the
input is indicative of a gear shift of the transmission.

25 18. The device according to claim 16, wherein said

controller sets a target control value corresponding to said target value of said torque to be transmitted, thereby maintaining said target control value for a period of time.